

WHAT IS CLAIMED IS:

1. A seal for use in a solid oxide fuel cell comprising a matrix of ceramic fibres and a plurality of solid particles interspersed between the ceramic fibres.
2. The seal of claim 1 wherein the solid particles comprise non-sintered ceramic particles.
3. The seal of claim 1 further comprising a binder material.
4. The seal of claim 1 wherein the fibres are randomly oriented.
5. The seal of claim 1 wherein the seal is compressed prior to use.
6. The seal of claim 2 wherein all or some of the ceramic fibres are selected from the group comprising alumina, zirconia, titania, magnesia or silica.
7. The seal of claim 6 wherein some or all of the ceramic particles are selected from the group comprising alumina, zirconia, titania, magnesia or silica.
8. The seal of claim 1 wherein a substantial portion of the solid particles have a particle size of less than about 1 micron.
9. The seal of claim 8 wherein the solid particles comprises a first portion and second portions wherein the particle size of the first portion is larger than the particle size of the second portion.
10. The seal of claim 9 wherein the first portion has a particle size of about 0.50 μm and the second portion has a particle size of about 0.17 μm or less.

11. The seal of claim 9 wherein the first portion has a particle size of about 0.50 μm and the second portion has a particle size of about 0.06 μm or less.

5 12. The seal of claim 9 wherein the fibres are alumina and the particles are alumina or zirconia.

13. The seal of claim 3 wherein the fibres are alumina fibres.

10 14. The seal of claim 6 wherein the particles are alumina or zirconia particles.

15 15. The seal of claim 1 or 8 wherein the solid particles comprise glass particles.

16. The seal of claim 15 wherein said glass particle soften but do not coalesce at the operating temperature of the SOFC.

17. A flexible gasket seal for use in a solid oxide fuel cell comprising a matrix of randomly oriented ceramic fibres and a plurality of non-sintered ceramic particles interspersed between the ceramic fibres wherein a first portion of the ceramic particles has a particle size larger than a second portion of the ceramic particles.

20 18. The seal of claim 17 wherein the first portion has a particle size of about 0.50 μm and the second portion has a particle size of about 0.17 μm or less.

25 19. The seal of claim 18 wherein the second portion has a particle size of about 0.06 μm or less.

20. The seal of claim 17 wherein the fibres comprise alumina fibres and the particles comprise alumina or zirconia particles.

21. A method of forming a gasket seal comprising the steps of:

- (a) providing a matrix of ceramic fibres; and
- (b) interspersing a plurality of solid particles within the fibre matrix.

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22. The method of claim 21 wherein the solid particles are non-sintered ceramic particles or glass particles.

10 23. The method of claim 21 or 22 wherein the solid particles are interspersed within the fibre matrix by contacting the fibre matrix with a suspension of the particles in a suitable liquid media and subsequently removing the liquid media.

15 24. The method of claim 21 wherein the solid particle suspension comprises a combination of first portion of non-sintered ceramic particles and a second portion of non-sintered ceramic particles wherein ceramic particles of the first portion are larger than ceramic particles of the second portion.

20 25. The method of claim 17 wherein the seal is compressed subsequent to interspersing the particles within the fibre matrix.

26. A method of forming a flexible ceramic seal comprising the steps of:

- (a) providing a matrix of ceramic fibres; and
- (b) interspersing a plurality of ceramic particles within the fibre matrix by contacting the fibre matrix with a suspension of the ceramic particles in a suitable liquid media and subsequently removing the liquid media, wherein said ceramic particles comprise a first portion of particles having a diameter of about 0.50 μm and a second portion of particles having a diameter of about 0.06 μm or less.

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